

REMARKS

In the present response, Claims 1, 3, 4, 5, 9, and 16 have been amended in order to improve the form of the claims and overcome the formal objections noted by the examiner. It is urged that the claims are now in proper form and are allowable for the reasons set forth below.

The present invention comprises a novel method for monitoring the interrelated functionality of the heart and respiratory system by tracking changes in the cardiac or heart beating sounds with respect to respiratory sounds representative of the respiratory cycle activity of the patient. A feature of the present invention that improves the functionality of the present system is that the process of the present invention processes the data in raw form and thereby preserves the phase information of the signals. Differences in phase information can produce substantially different analytical results, which would not be detectable without the phase information.

The fact that the present system employs raw data that includes phase information is referred to at several places in the specification. For example, on page 7, line 25 through page 8, line 3, it is stated: “The new method extracts features such as amplitude, duration, frequency content, template and chirp components of the heart sounds and clusters these features with respect to their timing in the respiratory cycle...” The reference to duration, template, and chirp components is particularly pertinent. The specification further states on page 8, line 19 that, “The grouping of synchronized stable features of the heart sounds...defines a baseline extent of Within Breath Variability (WBV).” Further, at page 10, lines 17-19, the specification states that, “Averaging is performed within each timing interval on the raw signal, the frequency content representation and on a time-frequency representation obtained by short form Fourier transform, Wigner distribution analysis or a more adapted time-frequency representation using continuous wavelet transform or best

basis and discrete wavelet representation.” (emphasis added). Reference to “the raw signal” and a “time frequency representation” are particularly indicative of the use of raw data that includes phase information. Reinforcing the fact that the process of the present invention includes phase information is the fact that there is no disclosure that the process employs any steps that would result in a loss of phase information.

In Shapiro, an important difference is that the Shapiro process eliminates phase information and phase locks (or in the patent language “phase fixes”). See col. 5, lines 24, 26, and elsewhere. Fixing the phase means that the information obtained from the raw signal is manipulated mathematically, obtaining the spectrum of the components of the sampled wave, while eliminating the temporal (associated with phase) information. In the present invention, temporal (and associated phase) information is not eliminated. Preservation of phase information is a significant benefit.

The claims of the present application have been amended in order to include the preservation of phase information or the use of data in “raw” form (which has the same effect). It is urged that the claims, as amended, clearly distinguish Shapiro and are allowable, and such action is respectfully requested. None of the other references of record in this case teach that Shapiro should be modified to include phase information. Accordingly, allowance of all of the claims remaining in the case is respectfully requested.

If the examiner feels that any further amendments in the claims in order to improve the form of the claims would be desirable, a telephone interview with the examiner in order

to expedite any necessary corrections and facilitate the allowance of the present application would be appreciated.

Respectfully submitted,
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